AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior listings, and all prior versions,

of claims in the application.

LISTING OF CLAIMS:

1. (Currently Amended)   An ultrasonic imaging system for transmitting an ultrasonic

pulse to a living body, receiving the ultrasonic pulse reflected by said living body, and

obtaining B-mode image data of said living body, comprising:

a structure extractor for extracting structure-emphasized image data in which a

structure of a tissue in said living body is emphasized from said B-mode image data;

a texture pattern extractor for extracting texture-emphasized image data in

which a texture pattern coming from properties of a tissue in said living body is

emphasized from said B-mode image data;

an image synthesizer for obtaining a synthesized image by weighting and

combining said structure-emphasized image data and said texture-emphasized image

data; and

a display for displaying at least one of said structure-emphasized image data,

said texture-emphasized image data, and said synthesized image;

wherein said structure extractor and said texture pattern extractor extract said

structure-emphasized image data and said texture-emphasized image data,

respectively, from the same B-mode image data.

2. (Original) The ultrasonic imaging system according to claim 1, wherein two

synthesized images to which different weights are assigned are displayed side by

side.

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3. (Original) The ultrasonic imaging system according to claim 1, wherein said structure extractor extracts a structure of a living body tissue constructed by a set of point reflectors which are continuously distributed in at least one direction In said living body.

4. (Original) The ultrasonic imaging system according to claim 1, wherein said texture pattern extractor extracts a component coming from a reflector constructed by a set of point reflectors which are not continuously distributed in said living body but are spread.

5. (Original) The ultrasonic imaging system according to claim 1, wherein said structure extractor comprises:

means for determining a region of peripheral pixels of each pixel in said B-mode Image data; and

means for obtaining a function for determining a weighting function on the basis of the difference between intensity of said each pixel and intensity of each of said peripheral pixels,

said function has a maximum point when it is 0,

an integral value of an absolute value of said function in a region from negative infinity to positive infinity is finite,

said weighting function on each of said peripheral pixels is determined from differentiation of said function, and

a value obtained by adding a sum of products of said weighting function and intensity of each of said peripheral pixels to intensity of each of pixels of said B-mode

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image data is used as signal intensity of each of pixels of said structure-emphasized image data.

6. (Original) The ultrasonic imaging system according to claim 1, further comprising a parameter controller for setting parameters for signal processing into said structure extractor, said texture pattern extractor, and said image synthesizer on the basis of a distribution of signal intensities of pixels in the same frame of said B-mode image data.

7. (Original) The ultrasonic imaging system according to claim 1, wherein said texture pattern extractor emphasizes said texture pattern by using a differential filter in two directions of signal intensities of pixels in the same frame of said B-mode image data.

8. (Currently Amended)   An ultrasonic imaging system comprising: .

an ultrasonic probe having a plurality of ultrasonic elements, for transmitting an ultrasonic pulse to a living body, and receiving the ultrasonic pulse reflected by said living body;

a transmit beam former for outputting a transmit signal of an ultrasonic wave transmitted from said ultrasonic probe;

a receive beam former for generating an RF signal as a receive beam signal from a signal received from said ultrasonic probe and outputting the RF signal;

a transmit/receive switch for switching transmission and reception of the ultrasonic wave to/from said ultrasonic probe;

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an envelope detector for detecting an envelope of said RF signal and outputting the envelope as a video signal;

a scan converter to which said video signal is input;

a structure extractor for extracting structure-emphasized image data in which a structure of a tissue in said living body is emphasized from an output of said scan converter;

a texture pattern extractor for extracting texture-emphasized image data in which a texture pattern coming from properties of a tissue in said living body is emphasized from an output of said scan converter;

an image synthesizer for obtaining a synthesized image by weighting and combining said structure-emphasized image data and said texture-emphasized image data;

a parameter controller for setting parameters for signal processing into said structure extractor, said texture pattern extractor, and said image synthesizer;

an input unit for receiving said parameters for signal processing and setting said parameters for signal processing into said parameter controller;

a control unit for controlling said transmit beam former, said transmit/receive switch, and said receive beam former on the basis of the control parameters supplied from said input unit; and

a display for displaying at least one of said structure-emphasized image data, said texture-emphasized image data, and said synthesized image;

wherein said structure extractor and said texture pattern extractor extract said structure-emphasized image data and said texture-emphasized image data, respectively, from the same B-mode image data.

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9. (Original) The ultrasonic imaging system according to claim 8, wherein said parameter controller sets said parameters for signal processing on the basis of said video signal.

10. (Original) The ultrasonic imaging system according to claim 8, wherein said control unit sets information regarding said ultrasonic probe and information regarding an image target region in said living body into said parameter controller.

11. (Original) The ultrasonic imaging system according to claim 8, further comprising a rendering processor for generating data for three-dimensionally displaying an image target region in said living body from an output of said image synthesizer,

wherein said image target region in said living body is three-dimensionally displayed on said display.

12. (Currently Amended) An ultrasonic imaging system comprising:

an ultrasonic probe having a plurality of ultrasonic elements, for transmitting an ultrasonic pulse to a living body, and receiving the ultrasonic pulse reflected by said living body;

a transmit beam former for outputting a transmit signal of an ultrasonic wave transmitted from said ultrasonic probe;

a receive beam former for generating an RF signal as a receive beam signal from a signal received by said ultrasonic probe and outputting the RF signal;

a transmit/receive switch for switching transmission and reception of the ultrasonic wave to/from said ultrasonic probe;

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a structure extractor for extracting structure-emphasized image data in which a structure of a tissue in said living body is emphasized from said RF signal;

a texture pattern extractor for extracting texture-emphasized image data in which a texture pattern coming from properties of a tissue in said living body is emphasized from said RF signal;

an image synthesizer for obtaining a synthesized image by weighting and combining said structure-emphasized image data and said texture-emphasized image data;

an envelope detector for detecting an envelope of an output signal of said image synthesizer and outputting the envelope as a video signal;

a scan converter to which said video signal is input;

a parameter controller for setting parameters for signal processing into said structure extractor, said texture pattern extractor, and said image synthesizer;

an input unit for receiving said parameters for signal processing and setting said parameters for signal processing into said parameter controller;

a control unit for controlling said transmit beam former, said transmit/receive switch, and said receive beam former on the basis of the control parameters supplied from said input unit; and

a display for displaying at least one of said structure-emphasized image data, said texture-emphasized image data, and said synthesized image;

wherein said structure extractor and said texture pattern extractor extract said structure-emphasized image data and said texture-emphasized image data, respectively, from the same B-mode image data.

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13. (Original)   The ultrasonic imaging system according to claim 12, wherein

said parameter controller sets said parameters for signal processing on the basis of

said receive signal.

14. (Currently Amended)   An ultrasonic imaging system comprising:

        an ultrasonic probe having a plurality of ultrasonic elements, for transmitting an

ultrasonic pulse to a living body, and receiving the ultrasonic pulse reflected by said

living body;

        a transmit beam former for outputting a transmit signal of an ultrasonic wave

transmitted from said ultrasonic probe;

        a receive beam former for generating an RF signal as a receive beam signal

from a signal received from said ultrasonic probe and outputting the RF signal;

        a transmit/receive switch for switching transmission and reception of the

ultrasonic wave to/from said ultrasonic probe;

        an envelope detector for detecting an envelope of said RF signal and

outputting the envelope as a video signal;

        a structure extractor for extracting structure-emphasized image data in which a

structure of a tissue in said living body is emphasized from said video signal;

        a texture pattern extractor for extracting texture-emphasized image data in

which a texture pattern coming from properties of a tissue in said living body is

emphasized from said video signal;

        an image synthesizer for obtaining a synthesized image by weighting and

combining said structure-emphasized image data and said texture-emphasized image

data;

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a scan converter to which an output signal of said image synthesizer is input as

a video signal;

a parameter controller for setting parameters for signal processing into said

structure extractor, said texture pattern extractor, and said image synthesizer;

an input unit for receiving said parameters for signal processing and setting

said parameters for signal processing into said parameter controller;

a control unit for controlling said transmit beam former, said transmit/receive

switch, and said receive beam former on the basis of the control parameters supplied

from said input unit; and

a display for displaying at least one of said structure-emphasized image data,

said texture-emphasized image data, and said synthesized image;

wherein said structure extractor and said texture pattern extractor extract said

structure-emphasized image data and said texture-emphasized image data,

respectively, from the same B-mode image data.

15. (Original)   The ultrasonic imaging system according to claim 14, wherein

said parameter controller sets said parameters for signal processing on the basis of

said video signal.

16. (Currently Amended)   An ultrasonic imaging system for transmitting an ultrasonic

pulse to a living body, receiving the ultrasonic pulse reflected by said living body, and

obtaining B-mode image data of said living body, comprising:

a structure extractor for extracting structure-emphasized image data in which a

structure of a tissue of said living body is emphasized by using data of said B-mode

image;

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a texture pattern extractor for extracting texture-emphasized image data in which a texture pattern coming from properties of a tissue in said living body is emphasized by using said B-mode image data in parallel with said structure extractor;

an image synthesizer for obtaining a synthesized image by weighting and combining said structure-emphasized image data and said texture-emphasized image data; and

a display for displaying at least one of said structure-emphasized image data, said texture-emphasized image data, and said synthesized image;

wherein said structure extractor and said texture pattern extractor extract said structure-emphasized image data and said texture-emphasized image data, respectively, from the same B-mode image data.

17. (Original)   An ultrasonic imaging system having means of transmitting an ultrasonic pulse to a living body, receiving the ultrasonic pulse reflected by said living body, and obtaining B-mode image data of said living body, a structure extractor for extracting structure-emphasized image data in which a structure of a tissue in said living body is emphasized from said B-mode image data, and a display for displaying said structure-emphasized image data,

wherein said structure extractor comprises:

means for determining a region of peripheral pixels of each pixel of said B-mode image data; and

means for obtaining a function for determining a weighting function on the basis of the difference between intensity of said each pixel and intensity of each of said peripheral pixels.

said function has a maximum point when it is 0,

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an integral value of an absolute value of said function in a region from negative

infinity to positive infinity is finite,

said weighting function for each of said peripheral pixels is determined from

differentiation of said function, and

a value obtained by adding a sum of products of said weighting function and

intensity of each of said peripheral pixels to intensity of each of pixels of said B-mode

image data is used as signal intensity of each of pixels of said structure-emphasized

image data.

18. – 27. (Cancelled)

28. (New)   The ultrasonic signal processing method according to claim 17, wherein

said structure extractor and said texture pattern extractor extract said structure-

emphasized image data and said texture-emphasized image data, respectively, from

the same B-mode image data.

29. (New)   An ultrasonic imaging system for transmitting an ultrasonic pulse to a

living body, receiving the ultrasonic pulse reflected by said living body, and obtaining

B-mode image data of said living body, comprising:

a structure extractor for extracting structure-emphasized image data in which a

structure of a tissue in said living body is emphasized from said B-mode image data;

a texture pattern extractor for extracting texture-emphasized image data in

which a texture pattern coming from properties of a tissue in said living body is

emphasized from said B-mode image data;

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an image synthesizer for obtaining a synthesized image by weighting and combining said structure-emphasized image data and said texture-emphasized image data; and

a display for displaying at least one of said structure-emphasized image data, said texture-emphasized image data, and said synthesized image;

wherein said structure extractor extracts a structure of a living body tissue constructed by a set of point reflectors which are continuously distributed in at least one direction in said living body.

30. (New) An ultrasonic imaging system for transmitting an ultrasonic pulse to a living body, receiving the ultrasonic pulse reflected by said living body, and obtaining B-mode image data of said living body, comprising:

a structure extractor for extracting structure-emphasized image data in which a structure of a tissue in said living body is emphasized from said B-mode image data;

a texture pattern extractor for extracting texture-emphasized image data in which a texture pattern coming from properties of a tissue in said living body is emphasized from said B-mode image data;

an image synthesizer for obtaining a synthesized image by weighting and combining said structure-emphasized image data and said texture-emphasized image data; and

a display for displaying at least one of said structure-emphasized image data, said texture-emphasized image data, and said synthesized image;

wherein said texture pattern extractor extracts a component coming from a reflector constructed by a set of point reflectors which are not continuously distributed in said living body but are spread.

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31. (New) An ultrasonic imaging system for transmitting an ultrasonic pulse to a living body, receiving the ultrasonic pulse reflected by said living body, and obtaining B-mode image data of said living body, comprising:

a structure extractor for extracting structure-emphasized image data in which a structure of a tissue in said living body is emphasized from said B-mode image data;

a texture pattern extractor for extracting texture-emphasized image data in which a texture pattern coming from properties of a tissue in said living body is emphasized from said B-mode image data;

an image synthesizer for obtaining a synthesized image by weighting and combining said structure-emphasized image data and said texture-emphasized image data; and

a display for displaying at least one of said structure-emphasized image data, said texture-emphasized image data, and said synthesized image;

wherein said structure extractor comprises:

means for determining a region of peripheral pixels of each pixel in said B-mode image data; and

means for obtaining a function for determining a weighting function on the basis of the difference between intensity of said each pixel and intensity of each of said peripheral pixels,

said function has a maximum point when it is 0,

an integral value of an absolute value of said function in a region from negative infinity to positive infinity is finite,

said weighting function on each of said peripheral pixels is determined from differentiation of said function, and

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a value obtained by adding a sum of products of said weighting function and intensity of each of said peripheral pixels to intensity of each of pixels of said B-mode image data is used as signal intensity of each of pixels of said structure-emphasized image data.

32. (New)   An ultrasonic imaging system for transmitting an ultrasonic pulse to a living body, receiving the ultrasonic pulse reflected by said living body, and obtaining B-mode image data of said living body, comprising:

a structure extractor for extracting structure-emphasized image data in which a structure of a tissue in said living body is emphasized from said B-mode image data;

a texture pattern extractor for extracting texture-emphasized image data in which a texture pattern coming from properties of a tissue in said living body is emphasized from said B-mode image data;

an image synthesizer for obtaining a synthesized image by weighting and combining said structure-emphasized image data and said texture-emphasized image data; and

a display for displaying at least one of said structure-emphasized image data, said texture-emphasized image data, and said synthesized image;

wherein said texture pattern extractor emphasizes said texture pattern by using a differential filter in two directions of signal intensities of pixels in the same frame of said B-mode image data.

33. (New)   An ultrasonic imaging system for transmitting an ultrasonic pulse to a living body, receiving the ultrasonic pulse reflected by said living body, and obtaining B-mode image data of said living body, comprising:

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a structure extractor for extracting structure-emphasized image data in which a structure of a tissue in said living body is emphasized from said B-mode image data;

a texture pattern extractor for extracting texture-emphasized image data in which a texture pattern coming from properties of a tissue in said living body is emphasized from said B-mode image data;

an image synthesizer for obtaining a synthesized image by weighting and combining said structure-emphasized image data and said texture-emphasized image data; and

a display for displaying at least one of said structure-emphasized image data, said texture-emphasized image data, and said synthesized image;

wherein said structure extractor and said texture pattern extractor extract said structure-emphasized image data and said texture-emphasized image data, respectively, from the same B-mode image data, and

wherein the B-mode image data is a single tomographic image.

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